WESTON®

# MODEL 1230
## DIGITAL PANEL METER

INSTRUCTIONS/PARTS LIST

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# FOR MODEL 1230

# DIGITAL PANEL METER

U.S. Patent 3,051,939
and Patents Pending

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**WESTON INSTRUMENTS, INC.**
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# INTRODUCTION

The Weston Model 1230 Digital Panel Meter is a miniature, single range, 3½ digit bi-polar, high input impedance instrument designed to indicate input DC voltage or current in one of 10 possible ranges. Full scale is 1000 digits with overrange capability to 1999 except the 1000 volt DC full scale range. An out-of-range condition is indicated by turning on the leading one digit with all other digits blanked. A minus (-) indicator is provided for negative polarity input signals.

The case front has an amber glare reduction filter. Zero adjustment is automatic. A single control for full scale adjustment is made accessible by removing the case front.

Figure 1 shows the pictorial view and overall dimensions of the meter.

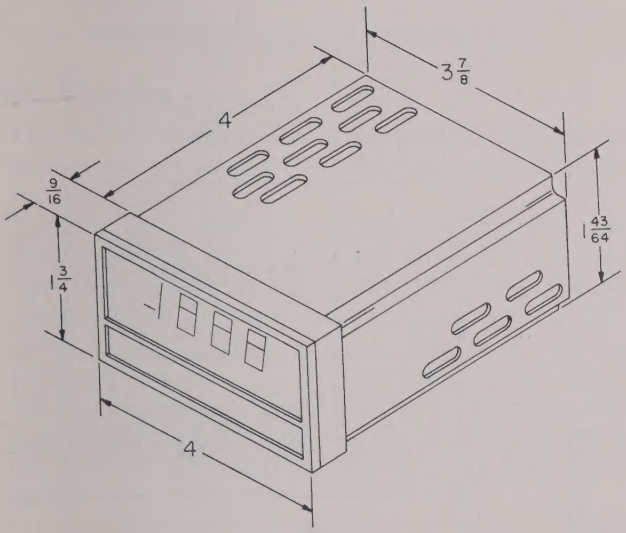



**Figure 1. Outline Dimensional Drawing**

## SPECIFICATIONS

| | |
|---|---|
| Minimum Range | 00.0 to 100.0m VDC |
| Overrange | 100% (except for 1000V range) |
| Rated Accuracy | ±0.1% of reading ±1 digit |
| Input Resistance | 100MΩ (See Table 1) |
| Bias Current | 2nA max. 0.7nA typical |
| Common Mode Rejection Ratio | 80dB with 1000 ohm unbalance at 60Hz |
| Normal Mode Rejection Ratio | 25dB at 60Hz (6dB for 1 volt Range) |
| Speed | 7.5 readings per second |
| Response Time | 1 second |
| Maximum Voltage Overload | 60VDC (100m V range) See Table 1 |
| Stability | ±0.1% full scale |
| Power | 117V nominal 105V to 125V<br>50Hz to 60Hz 4.7 Watts |
| Weight | Approx. 13 ounces |
| Operating Temperature | 0°C to 50°C |
| Storage Temperature | -40°C to 70°C |
| Temperature Coefficient | of zero ±25 ppm/°C<br>of full scale ±100 ppm/°C |
| BCD Output (Optional) | 2 TTL Load |

**TABLE 1.**
**TABLE OF SPECIFICATIONS**

| PART NO. 117VAC | PART NO. 117VAC WITH BDC | RANGE | SENSITIVITY | INPUT IMPEDANCE | FULL SCALE | MAXIMUM VOLTAGE OVERLOAD |
|---|---|---|---|---|---|---|
| 274871 | 274900 | 100mV | 0.1mV | 100M Ω | 100.0 | 60V |
| 274872 | 274901 | 1V | 0.001V | 100M Ω | 1.000 | 60V |
| 274873 | 274902 | 10V | 0.01V | 5M Ω | 10.00 | 1000V |
| 274874 | 274903 | 100V | 0.1V | 5M Ω | 100.0 | 1000V |
| 274875 | 274904 | 1000V | 1V | 5M Ω | 1000 | 1100V |
| 274876 | 274905 | 10uA | 0.01uA | 10K Ω | 10.00 | – |
| 274877 | 274906 | 100uA | 0.1uA | 1K Ω | 100.0 | – |
| 274878 | 274907 | 1mA | 0.001mA | 100 Ω | 1.000 | – |
| 274879 | 274908 | 10mA | 0.01mA | 10 Ω | 10.00 | – |
| 274880 | 274909 | 100mA | 0.1mA | 1 Ω | 100.0 | – |

## INSTALLATION – MECHANICAL

### Panel Mounting

1. Unpack the meter and perform a visual inspection to assure that no damage has occurred during shipment or handling.
2. Remove front assembly. Rotate the four mounting screws (located in the four inner corners) 3 or 4 times counterclockwise to position the mounting cams correctly. Mount the main assembly (see Figure 2) on a panel 1/16 to 1/8 inch thick. The panel shall be prepared in accordance with the panel cut-out dimensions as shown in Figure 3. Rotate the four mounting screws clockwise to position the mounting cams in the lock position and secure the instrument to the panel.

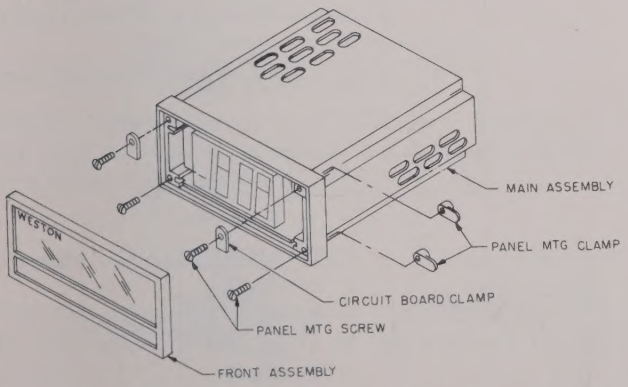



**Figure 2. Meter Mounting Drawing**

3. The front assembly can be secured into position at this time. This front assembly will have to be removed to adjust and calibrate the meter.

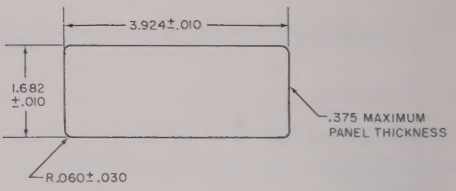
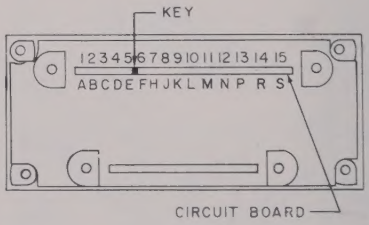



**Figure 3. Panel Cut-Out Dimensions**

## INSTALLATION – ELECTRICAL

The Digital Panel Meter has provisions to accept a connector at the rear of the case. A connector package is supplied as an accessory under Weston Part Number 267253-901. It consists of a connector ELCO no. 00-6007-030-980-002 and two screws No. 4-40 thd x 1/2 inch long, binding head.




1. EXTERNAL REF.
2. SIGNAL INPUT
3. PRINT COMMAND
4. POLARITY
5. BCD 8
6. BCD 2
7. BCD 80
8. BCD 20
9. BCD 800
10. SIGNAL GND
11. BCD 400
12. BCD 200
13. SPARE
14. BCD 1000
15. 117/234 VAC LINE 1

A. SIGNAL INPUT 10V, 100V, 1000V
B. SPARE
C. OUTRANGE
D. HOLD (Open Collector)
E. BCD 1
F. BCD 4
H. BCD 10
J. BCD 40
K. BCD 100
L. DP 3
M. DP 2
N. DIGITAL GND, BCD GND
P. DP 1
R. SHIELD
S. 117/234 VAC LINE 2

**Figure 4. Rear View of Pin Designation**

## ELECTRICAL INPUTS

### Hold

A transistor switch or an open collector TTL microcircuit connected to the hold terminal (Pin D) can be used to keep the voltage level low and defeat the synchronizing signal applied to the synchronizing divider. This will prevent the generation of a reset pulse. In application, the signal to this terminal should be free of contact bounce or any spurious spike signals. Resistance — capacitance filtering may be required for noisy sources.

### External Reference

An external reference may be used for ratio operation. The reference should be of positive polarity and may change ±20% without degrading accuracy. Disconnect pads C and D to minimize loading.

### Remote Decimal Point

External connection of a 47,000 ohm resistor to ground may be used to program the decimal point to any one of the three positions.

## OPERATION

1. After the meter has been panel mounted, connect a 117 volt single phase 50Hz or 60Hz power line as follows:
   a. One side of AC line to Pin 15
   b. Other side of AC line to Pin S
   c. Earth ground to Pin R
2. Allow meter to warm up for 15 minutes.
3. Remove front assembly.
4. Short signal input pins and meter should read zero with polarity lamp either off, on, or blinking.

5. Remove short and apply a standard source to the signal input pins. Apply full scale signal and rotate potentiometer at left end of display until meter reads 1000 ±1 digit. Reverse signal polarity and check for reading of 1000.
6. Full scale digital presentation is tabulated in Table 1. However, the meter can OVERRANGE an additional 999 digits for either polarity. If a larger signal is applied only the leading one digit will illuminate and the remaining three digits will be blanked out in this OUT-OF-RANGE condition.
7. Selection of the decimal point is accomplished by shorting a solder bridge on the display board. The bridges are numbered 1 through 3 (See Figure 5) referred to the spaces between digits from left to right.

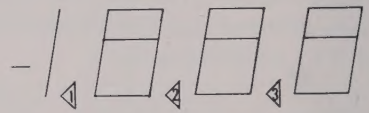


**Figure 5. Selection of Decimal Point**

8. Table 2 is an example of display indication for a one volt range meter.

**TABLE 2.**
**DISPLAY FOR A 1 VOLT RANGE**

| APPLIED SIGNAL VOLTAGE | INDICATION |
|---|---|
| +2.000 & higher | 1. |
| + .000 to 1.999 | .000 to 1.999 |
| - .000 to -1.999 | - .000 to -1.999 |
| -2.000 & higher | -1. |

9. Some meters are equipped with a zero adjustment potentiometer which is normally factory set. For applications where a fixed offset is desired, and the adjustment is accessible through a slot on the left side of the case, near the back.

## THEORY OF OPERATION

### General

The instrument utilizes a dual slope integrating technique which converts the input signal into a ratio of two time intervals, both proportional to clock period, making the accuracy of conversion independent of clock accuracy, and independent of integrator time constant drift. Refer to Figure 6 Block Diagram. Conversion begins with a reset pulse from the SYNC DIVIDER which resets the decade counters, turns on the 300kHz OSCILLATOR for 3.33 milliseconds and applies the

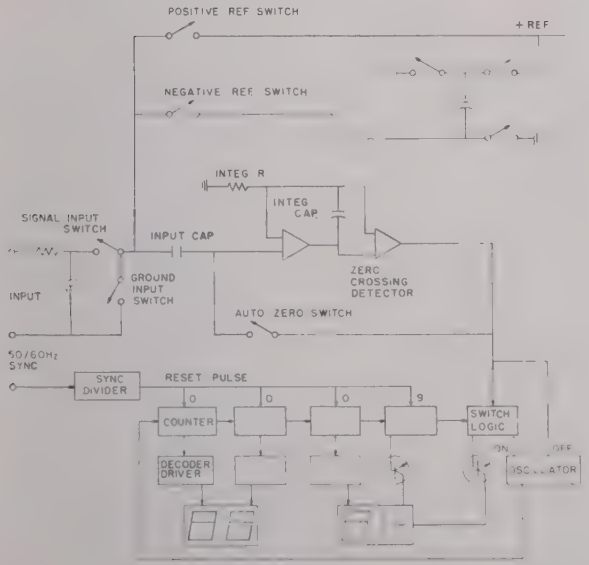



**Figure 6. Block Diagram**

input signal through the SIGNAL INPUT SWITCH and the INPUT CAPACITOR to the INTEGRATOR AMPLIFIER. The output of the integrator, at this time, is of the same polarity as the input signal. This polarity is sensed by the zero crossing detector and causes a reference switch of opposite polarity to close, effecting a discharge of the integrating capacitor to a zero level at which time the ZERO CROSSING DETECTOR turns off the OSCILLATOR, and leaves the counters set to a BCD number representing the input signal. The BCD number is decoded into a seven segment form and actuates current source drivers which light up the segments of a seven-bar gas-discharge display tube.

**Waveforms (Ref Figure 7)**

The integrating cycle is divided into two intervals, signal ramp up $T_1$ and reference ramp down $T_2$. During $T_1$ the integrator charges to a voltage $\frac{e_{in} T_1}{RC}$

During $T_2$ the discharge voltage is $\frac{e_{ref} T_2}{RC}$

Equating these voltages $T_2 = \frac{e_{in}}{e_{ref}} T_1$

Since the frequency of the clock is the same for intervals $T_2$ and $T_1$, the number of pulses occurring during these intervals will be in similar ratio

$$N_2 = \frac{e_{in}}{e_{ref}} \times N_1$$

By making $N_1 = 1000$ $\qquad N_2 = \frac{1000}{e_{ref}} \times e_{in}$

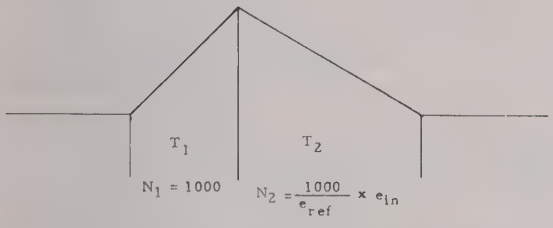



**Figure 7. Integrator Output Voltage for $e_{in}$ Positive**

## Display (Ref Figure 8)

The integrating period $T_1$ is started at the time $t_o$ that the line voltage passes through zero in the negative going direction. During the periods $T_1$ and $T_2$ the anode supply for the display tubes tends to be of negative polarity but is blocked by diode CR 101 so that the voltage is nearly zero and the display is blanked. When the counters have reached a number $N_2$ proportional to $e_{in}$ the anode voltage may already be positive but not of sufficient magnitude to cause conduction $t_2$. A short time later $t_3$ conduction is initiated and still later $t_4$ is limited in magnitude by the current driver circuits.

The anode current is thus seen to flow in pulses with the integrating or converting period timed to occur during blanking so as to avoid a blurred or flickering display.

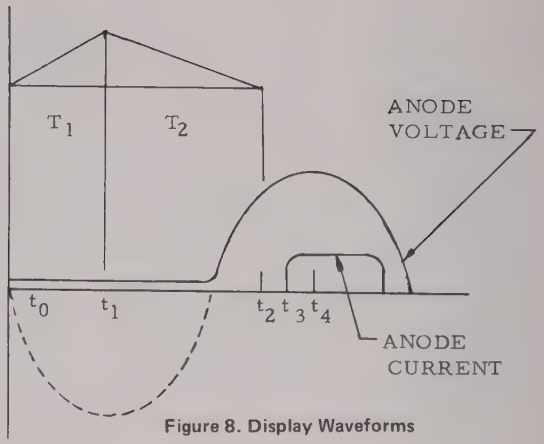



Figure 8. Display Waveforms

## Switch Logic

### Reset

Sync divider U107 receives signals of line frequency via divider R119 and R136. When the eighth negative going signal is received, the D output pin 11 goes positive generating a reset signal for decade counters U106, U109, U110, and U111. R140 and C110 act as a 1 microsecond delay network so the reset pulse terminates itself after that interval by resetting U107 via pin 2.

### Polarity

Polarity FF - Switch Counter U106 is preset to state 9 by the reset signal applied to pin 6. Output A pin 12 is set high corresponding to negative polarity. Output B and C are low and output D pin 11 is set high corresponding to the signal integrate command. When C is low and D is high the oscillator is enabled and the first part of the conversion cycle proceeds for 1000 clock pulses to integrate the input signal.

The oscillator is enabled by C low to U112 pin 9 which inverts and has pin 8 high which applied to pin 4 of U108 enables that gage of the oscillator. The other necessary signal results from D high which is applied to U112 pin 11 which inverts and has pin 10 low which sets flip-flop U113/U108 so U113 pin 11 is high (PRINT COMMAND) which is applied to pin 5 of U108 enabling that gate of the oscillator.

The input signal is applied to the integrator by U102 pins 1 and 2, and is connected by applying a positive signal to pin 13 from pin 11 of U114 which is an inverter and level shifter. The low signal of U114 pins 12 and 13 is at a TTL low level, obtained from U112 pin 10 which has a high level at pin 11 from U106 pin 11 having had its D output set high by the reset pulse from the sync divider.

At the end of 800 pulses a decision is made to change polarity to positive if the integrator output has gone positive. This is done by the comparator and the D output of the third decade counter U111 pin 11 acting on U108 pin 8. The comparator output pin 7 goes low for a positive signal input. This low signal applied to U112 pin 13 is inverted to a high at pin 12 which applied to pin 9 of U108 enables that gate. The decade counter U111 pin 11 is connected to pin 10 of U108 and enables that gate at a count of 800. Pin 11 of U108 is enabled during the first 1000 pulses only by U106 pin 11 so as to avoid further toggling when large signal inputs cause U111 to count through the state of 800 a second or third time.

## Print Command

The print command flip-flop U113/U108 pin 11 is set high by U112 pin 10 low at the beginning of conversion. At the end of conversion the flip-flop will be turned off by signals at either pin 1 or pin 2 or U108 dependent on polarity of input signal, negative or positive respectively.

For a negative polarity U106 pin 12 is high U113 pin 2 is high and inverter U112 pin 6 is low and applied to U113 pin 4 causes U113 pin 6 to remain high making U102 pin 2 gate input ineffective. The comparator output is high during conversion, then at zero crossing goes low. This causes U112 pin 12 to go high which drives U113 pin 1 high allowing U113 pin 3 to go low and turn off the PRINT COMMAND FF by U108 pin 1.

For a postive polarity U113 pin 4 is held high by the polarity FF U106 pin 12 to the low state inverted by U112 pin 6. The comparator output is low during conversion, U112 pin 4 is low, and coupled to U113 pin 5 causes U113 pin 6 to remain high until zero crossing. At zero crossing, high comparator output causes U114 pin 4 to go high, U113 pin 5 is high, U113 pin 6 low, U108 pin 2 102 which terminates print command.

## Reference Polarity

Reference voltage sources are turned on by gate U113 pin 8 in response to input pins 9 and 10 high. Pin 9 is enabled by PRINT COMMAND. Pin 10 is enabled at the end of 1000 counts by inverter U112 pin 10 which inverts the D signal of the switch counter C106 pin 11.

The choice of polarity of reference signal comes from the comparator, for a positive signal input the comparator output is low, U112 pin 12 is high disabling output of U114 pin 4. U112 pin 4 low enables U114 pin 3 to go high turning on the N signal which connects the negative reference voltage stored on C103.

For a negative input signal, comparator output is high, U112 pin 12 is low enabling U114 pin 4 which can turn on the R signal which connects the positive voltage reference of divider R117, R116, R115, R141, R142 via U102 pins 10 and 11.

**BCD Outputs (Optional)**

Binary - coded - decimal outputs are available from the decade counters with a 1 2 4 8 code using positive logic with standard TTL levels of 0.4 volts and 2.4 volts for the 0 and 1 state respectively. The drive is sufficient to sink two standard loads, 3.2mA, in the low state.

## TABLE 3
## RANGING COMPONENTS

| BOARD ASSY | RANGE | C101 | C111 | C116 | C117 | R101 | R102 | R103 | R142 | R144 |
|---|---|---|---|---|---|---|---|---|---|---|
| 274721-901 | 100mV | - | Selected | 269951-001 | 269951-001 | - | - | - | - | Selected |
| 274721-902 | 1V | 270034-001 | - | - | - | - | - | - | Selected | - |
| 274721-903 | 10V | - | Selected | 269953-001 | 269953-001 | 270197-001 | 270197-001 | 269884-001 | - | Selected |
| 274721-904 | 100V | - | Selected | 269951-001 | 269951-001 | 270197-001 | 270197-001 | 269911-001 | - | Selected |
| 274721-905 | 1000V | - | Selected | 269951-001 | 269951-001 | 270197-001 | 270197-001 | 270194-001 | - | Selected |
| 274721-906 | 10μA | - | Selected | 269951-001 | 269951-001 | - | - | 266627-001 | - | Selected |
| 274721-907 | 100μA | - | Selected | 269951-001 | 269951-001 | - | - | 266628-001 | - | Selected |
| 274721-908 | 1mA | - | Selected | 269951-001 | 269951-001 | - | - | 264775-001 | - | Selected |
| 274721-909 | 10mA | - | Selected | 269951-001 | 269951-001 | - | - | 264773-001 | - | Selected |
| 274721-910 | 100mA | - | Selected | 269951-001 | 269951-001 | - | - | 264776-001 | - | Selected |

2.2μf

15μf ±20% 10V

49.9kΩ ±1%

499Ω 1%

## TABLE 4
## COMPONENT DESCRIPTION

| PART NUMBER | DESCRIPTION |
|---|---|
| 264773-001 | RESISTOR, 10 ohms ±1%, 2 Watts |
| 264775-001 | RESISTOR, 100 ohms ±1%, 2 Watts |
| 264776-001 | RESISTOR, 1 ohm ±1%, 2 Watts |
| 266627-001 | RESISTOR, 10k ohms ±1%, 1/8 Watt |
| 266628-001 | RESISTOR, 1k ohms ±1%, 1/8 Watt |
| 269884-001 | RESISTOR, 49.9k ohms ±1%, 1/8 Watt |
| 269911-001 | RESISTOR, 4.99k ohms ±1%, 1/8 Watt |
| 269951-001 | CAPACITOR, 15μF ±20%, 10 WVDC |
| 269953-001 | CAPACITOR, 2.2μF ±20%, 35 WVDC |
| 270034-001 | CAPACITOR, 0.68μF ±20%, 50 WVDC |
| 270194-001 | RESISTOR, 499 ohms ±1%, 1/8 Watt |
| 270197-001 | RESISTOR, 2.49M ohms ±1%, 3/4 Watt |

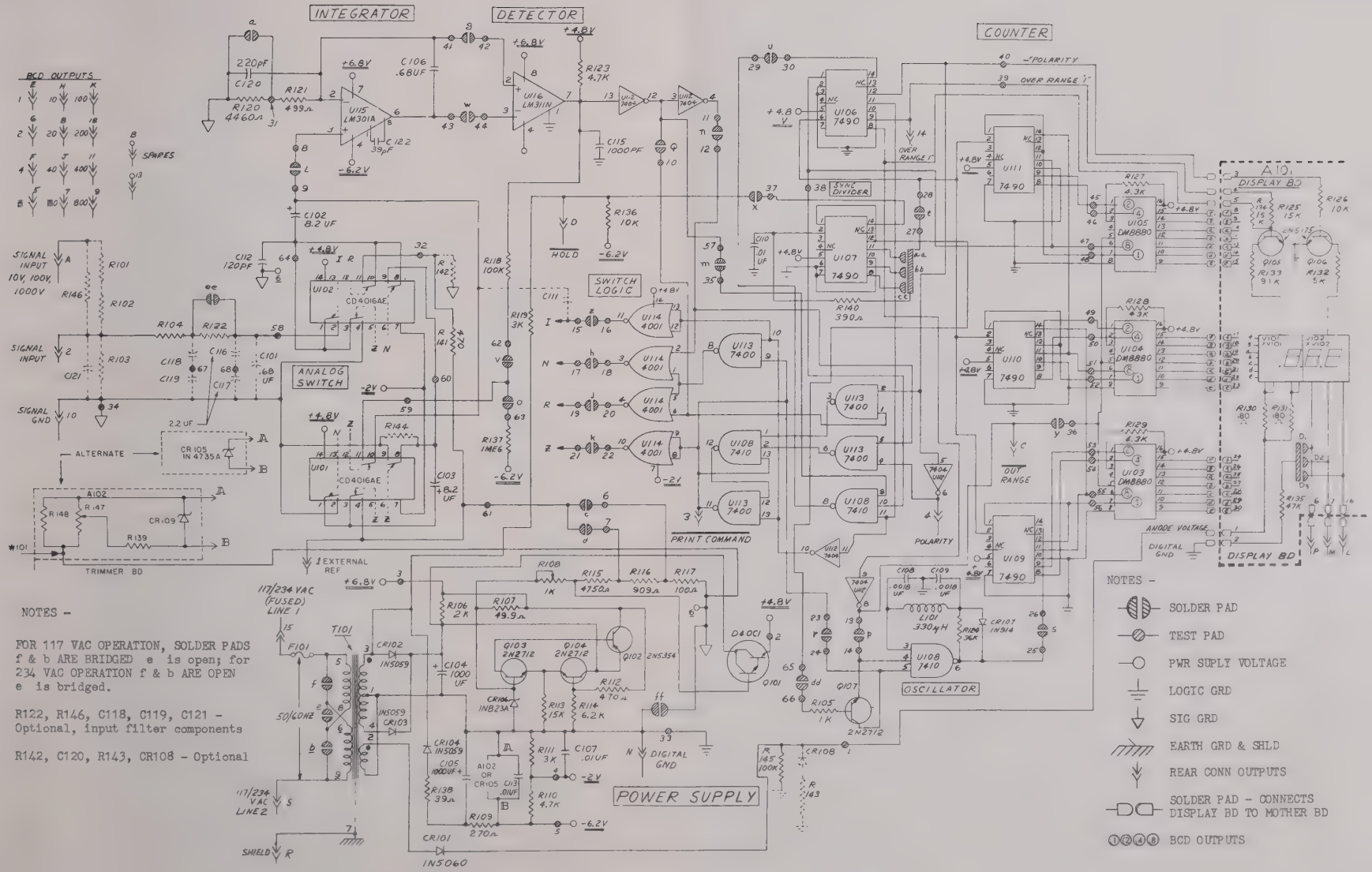



**Figure 9. Schematic Diagram**

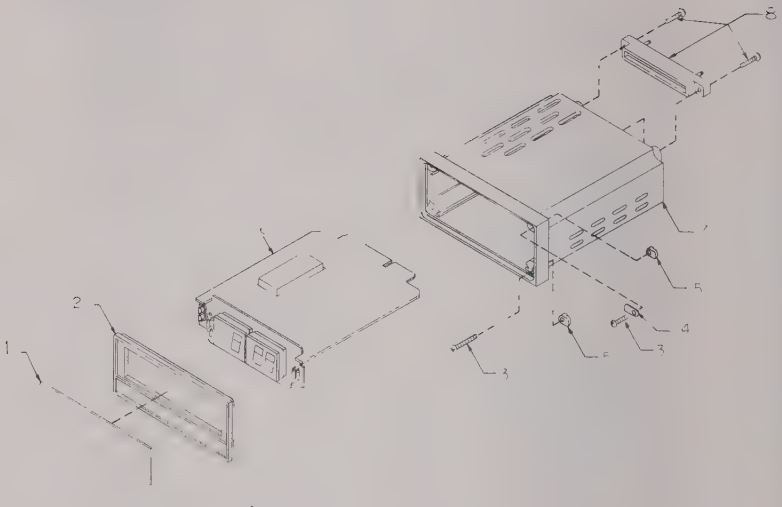



**Figure 10. Assembly**

| ITEM NUMBER | DESCRIPTION | PART NUMBER |
|---|---|---|
| 1 | WINDOW, MILLIVOLTS | 267371-901 |
| 1 | WINDOW, VOLTS | 267371-902 |
| 1 | WINDOW, MICROAMPERES | 267371-903 |
| 1 | WINDOW, MILLIAMPERES | 267371-904 |
| 2 | FRONT | 265657-901 |
| 3 | SCREW | 266623-045 |
| 4 | CLAMP, CIRCUIT BOARD | 265663-001 |
| 5 | CLAMP, PANEL MTG - | 265661-024 |
| 6 | BOARD ASSY (Ref Table 3) | — |
| 7 | CASE, With BCD | 274774-903 |
| 7 | CASE, Without BCD | 274774-901 |
| 8 | CONNECTOR PACKAGE (Per Order) | 267253-901 |

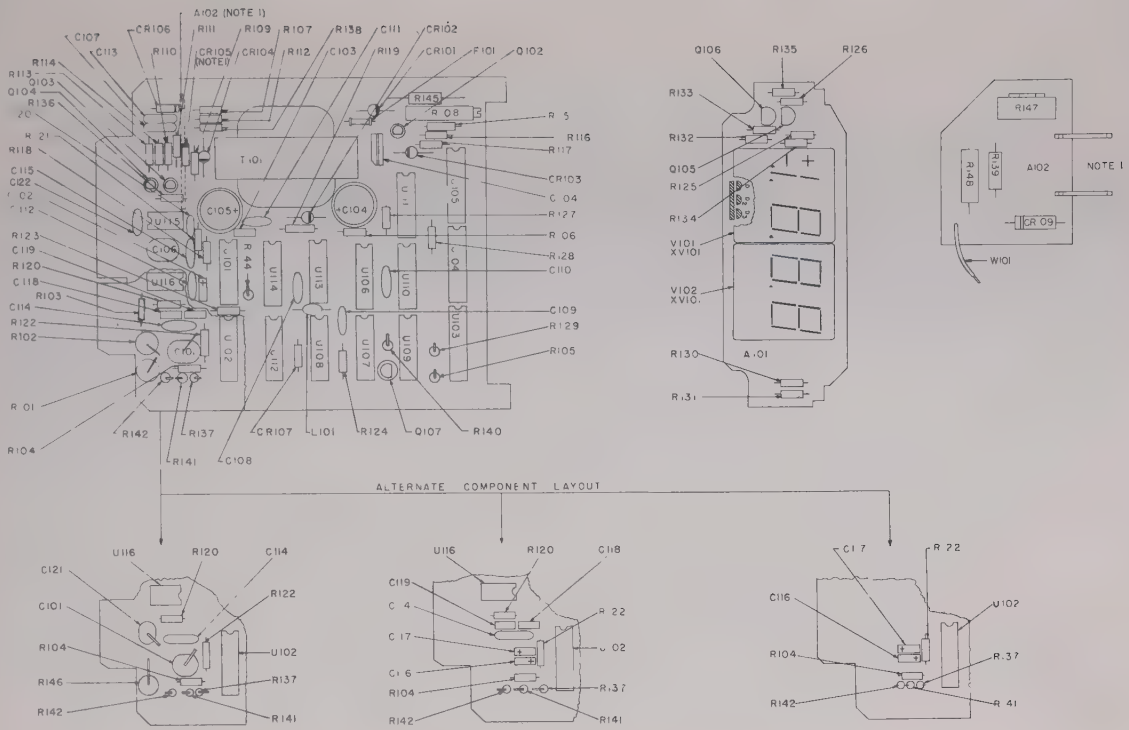



**Figure 11. Board Assembly**

# PARTS LIST

| REFERENCE SYMBOL | DESCRIPTION | PART NUMBER |
|---|---|---|
| | BOARD ASSY (Ref Figure 11) | |
| A101 | DISPLAY BOARD ASSY (See sep. list for details) | 274711-901 |
| A102 | TRIMMER BOARD ASSY(See sep. list for details) | 275727-902 |
| C101 | CAPACITOR (Ref Table 3) | — |
| C102 | CAPACITOR, 8.2uF ±20%, 15WVDC | 269952-001 |
| C103 | CAPACITOR, 8.2uF ±20%, 15WVDC | 269952-001 |
| C104 | CAPACITOR, 1000uF +50%, -10%, 10WVDC | 275631-001 |
| C105 | CAPACITOR, 1000uF +50%, -10%, 10WVDC | 275631-001 |
| C106 | CAPACITOR, 0.68uF ±20%, 50WVDC | 270034-001 |
| C107 | CAPACITOR, 0.01uF +80%, -20%, 50WVDC | 269899-001 |
| C108 | CAPACITOR, 1800pF ±10%, 1000WVDC | 275690-001 |
| C109 | CAPACITOR, 1800pF ±10%, 1000WVDC | 275690-001 |
| C110 | CAPACITOR, 0.01uF +80%, -20%, 50WVDC | 269899-001 |
| C111 | CAPACITOR (Ref Table 3) | — |
| C112 | CAPACITOR, 120pF ±10%, 1000WVDC | 264090-001 |
| C113 | CAPACITOR, 0.01uF +80%, -20%, 50WVDC | 269899-001 |
| C115 | CAPACITOR, 1000pF ±10%, 1000WVDC | 266417-001 |
| C116 | CAPACITOR (Ref Table 3) | — |
| C117 | CAPACITOR (Ref Table 3) | — |
| *C118 | CAPACITOR | — |
| *C119 | CAPACITOR | — |
| C120 | CAPACITOR, 220pF ±10%, 1000WVDC | 264091-001 |
| *C121 | CAPACITOR | — |
| C122 | CAPACITOR, 39pF ±5%, 300WVDC (for 1V range) | 269949-001 |
| CR101 | DIODE, 1N5060 | 266591-001 |
| CR102 | DIODE, 1N5059 | 266611-001 |
| CR103 | DIODE, 1N5059 | 266611-001 |
| CR104 | DIODE, 1N5059 | 266611-001 |
| CR105 | DIODE, 1N4735A | 264600-001 |
| CR106 | DIODE, 1N823A | ND60978-001 |
| CR107 | DIODE, 1N914 | 61025-001 |
| *CR108 | DIODE | — |
| F101 | FUSE, 1/2 AMP, 125V | 272753-001 |
| L101 | INDUCTOR, 330uH ±10% | 274718-001 |
| Q101 | TRANSISTOR, D40C1 | 268797-001 |
| Q102 | TRANSISTOR, 2N5354 | 268795-001 |
| Q103 | TRANSISTOR, 2N2712 | 39917-001 |
| Q104 | TRANSISTOR, 2N2712 | 39917-001 |
| Q107 | TRANSISTOR, 2N2712 | 39917-001 |

*Optional - Not used on catalog instruments

| REFERENCE SYMBOL | DESCRIPTION | PART NUMBER |
|---|---|---|
| | BOARD ASSEMBLY (Ref. figure 11 Continued) | |
| R101 | RESISTOR (Ref Table 3) | — |
| R102 | RESISTOR (Ref Table 3) | — |
| R103 | RESISTOR (Ref Table 3) | — |
| R104 | RESISTOR, 10k ohms ±5%, 1/4 Watt | 264673-001 |
| R105 | RESISTOR, 1k ohms ±5%, 1/4 Watt | 266612-001 |
| R106 | RESISTOR, 2k ohms ±5%, 1/4 Watt | 272327-001 |
| R107 | RESISTOR, 49.9 ohms ±1%, 1/8 Watt | 269886-001 |
| R108 | RESISTOR, VARIABLE, 1k ohms ±10%, 1 Watt | 270162-001 |
| R109 | RESISTOR, 270 ohms ±5%, 1/4 Watt | 272717-001 |
| R110 | RESISTOR, 4.7k ohms ±5%, 1/4 Watt | 263652-001 |
| R111 | RESISTOR, 3k ohms ±5%, 1/4 Watt | 269857-001 |
| R112 | RESISTOR, 470 ohms ±5%, 1/4 Watt | 274196-001 |
| R113 | RESISTOR, 15k ohms ±5%, 1/4 Watt | 263655-001 |
| R114 | RESISTOR, 6.2k ohms ±5%, 1/4 Watt | 276361-001 |
| R115 | RESISTOR, 4750 ohms ±1%, 1/8 Watt | 272238-001 |
| R116 | RESISTOR, 909 ohms ±1%, 1/8 Watt | 272543-001 |
| R117 | RESISTOR, 100 ohms ±1%, 1/8 Watt | 269925-001 |
| R118 | RESISTOR, 100k ohms ±5%, 1/4 Watt | 266592-001 |
| R119 | RESISTOR, 3k ohms ±5%, 1/4 Watt | 269857-001 |
| R120 | RESISTOR, 4460 ohms ±1%, 1/8 Watt | 272216-001 |
| R121 | RESISTOR, 499 ohms ±1%, 1/8 Watt | 270194-001 |
| *R122 | RESISTOR | — |
| R123 | RESISTOR, 4.7k ohms ±5%, 1/4 Watt | 263652-001 |
| R124 | RESISTOR, 36k ohms ±5%, 1/4 Watt | 272207-001 |
| R127 | RESISTOR, 4.3k ohms ±5%, 1/4 Watt | 266323-001 |
| R128 | RESISTOR, 4.3k ohms ±5%, 1/4 Watt | 266323-001 |
| R129 | RESISTOR, 4.3k ohms ±5%, 1/4 Watt | 266323-001 |
| R137 | RESISTOR, 1M ohms ±5%, 1/4 Watt | 268782-001 |
| R138 | RESISTOR, 39 ohms ±5%, 1/4 Watt | 274200-001 |
| R140 | RESISTOR, 390 ohms ±5%, 1/4 Watt | 272246-001 |
| R141 | RESISTOR, 470 ohms ±5%, 1/4 Watt | 274196-001 |
| R142 | RESISTOR (Ref Table 3) | — |
| *R143 | RESISTOR | — |
| R144 | RESISTOR (Ref Table 3) | — |
| R145 | RESISTOR, 100k ohms ±5%, 1/2 Watt | 264086-001 |
| *R146 | RESISTOR | — |
| T101 | TRANSFORMER | 274439-901 |
| U101 | INTEGRATED CIRCUIT, CD4016AE | 274716-001 |
| U102 | INTEGRATED CIRCUIT, CD4016AE | 274716-001 |
| U103 | INTEGRATED CIRCUIT, DM8880 | 274715-001 |
| U104 | INTEGRATED CIRCUIT, DM8880 | 274715-001 |
| U105 | INTEGRATED CIRCUIT, DM8880 | 274715-001 |

*Optional - Not used on catalog instruments

| REFERENCE SYMBOL | DESCRIPTION | PART NUMBER |
|---|---|---|
| | BOARD ASSEMBLY (Ref. figure 11 Continued) | |
| U106 | INTEGRATED CIRCUIT, 7490 | 272267-001 |
| U107 | INTEGRATED CIRCUIT, 7490 | 272267-001 |
| U108 | INTEGRATED CIRCUIT, 7410 | 272268-001 |
| U109 | INTEGRATED CIRCUIT, 7490 | 272267-001 |
| U110 | INTEGRATED CIRCUIT, 7490 | 272267-001 |
| U111 | INTEGRATED CIRCUIT, 7490 | 272267-001 |
| U112 | INTEGRATED CIRCUIT, 7404 | 272759-001 |
| U113 | INTEGRATED CIRCUIT, 7400 | 272264-001 |
| U114 | INTEGRATED CIRCUIT, 4001 | 274717-001 |
| U115 | INTEGRATED CIRCUIT, LM301A | 272691-001 |
| U116 | INTEGRATED CIRCUIT, LM311N | 274122-001 |
| — | BOARD, DRILLED | 274720-901 |
| | DISPLAY BOARD ASSY (Ref Figure 11) | |
| Q105 | TRANSISTOR, 2N5175 | 266585-001 |
| Q106 | TRANSISTOR, 2N5175 | 266585-001 |
| R125 | RESISTOR, 15k ohms ±5%, 1/4 Watt | 263655-001 |
| R126 | RESISTOR, 10k ohms ±5%, 1/4 Watt | 264673-001 |
| R130 | RESISTOR, 180 ohms ±5%, 1/4 Watt | ND20593-001 |
| R131 | RESISTOR, 180 ohms ±5%, 1/4 Watt | ND20593-001 |
| R132 | RESISTOR, 15k ohms ±5%, 1/4 Watt | 263655-001 |
| R133 | RESISTOR, 9.1k ohms ±5%, 1/4 Watt | 270121-001 |
| R134 | RESISTOR, 15k ohms ±5%, 1/4 Watt | 263655-001 |
| R135 | RESISTOR, 47k ohms ±5%, 1/4 Watt | 264676-001 |
| V101 | DISPLAY, NUMERIC, 1 1/2 Digit | 274712-001 |
| V102 | DISPLAY, NUMERIC, 2 Digit | 274713-001 |
| XV101 | SOCKET, DISPLAY | 274714-001 |
| XV102 | SOCKET, DISPLAY | 274714-001 |
| — | BOARD, DRILLED | 274710-901 |
| | TRIMMER BOARD ASSY (Ref Figure 11) | |
| CR109 | DIODE, 1N4735A | 264600-001 |
| R139 | RESISTOR, 3.01k ohms ±1%, 1/8 Watt | 272217-001 |
| R147 | RESISTOR, VARIABLE, 100 ohms ±20%, 0.2 Watt | 276311-001 |
| R148 | RESISTOR, 0.24 ohms ±10%, 1 Watt | 276324-001 |
| W101 | WIRE, HOOKUP | 246374-942 |
| — | BOARD, DRILLED | 275728-901 |

## WESTON EQUIPMENT WARRANTY

Weston warrants equipment of its manufacture against defective materials or workmanship for a period of one year from date of shipment.

The liability of Seller under this warranty is limited, at Seller's option, solely to repair, replacement with equivalent Weston equipment, at an appropriate credit adjustment not to exceed the original equipment sales price, of equipment returned to the Seller provided that (a) Seller is promptly notified in writing by Buyer upon discovery of defects, (b)Upon receipt of written authorization from Seller the defective equipment is returned as directed, transportation charges prepaid by Buyer, and (c) Seller's examination of such equipment discloses to his satisfaction that defects were not caused by negligence, misuse, improper installation, accident, or unauthorized repair or alteration by the Buyer.

This warranty does not include mechanical parts failing from normal usage nor does it cover limited life electrical components which deteriorate with age such as tubes, lamps, etc.

This warranty is in lieu of all other warranties, expressed or implied, including the implied warranty of fitness for a particular purpose to the original purchaser or to any other person. Seller shall not be liable for consequential damages of any kind.

The aforementioned provisions do not extend the original warranty period of any article which has been either repaired or replaced by Seller.

# NOTES

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